Ontario

Apprenticeship
In-school Curriculum Standard

Roofer

Levels 1 and 2

449A

Ministry of Training, Colleges and Universities

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Introduction

This new curriculum standard for the Roofer trade program is based upon the on-the-job performance objectives, located in the industry-approved training standard.

The curriculum is organized into 2 levels of training. The Program Summary of Reportable Subjects chart summarizes the training hours for each reportable subject.

The curriculum identifies only the learning that takes place off-the-job. The in-school program focuses primarily on the theoretical knowledge and the essential skills required to support the performance objectives of the Apprenticeship Training Standards. Sponsors are expected to extend the apprentice's knowledge and skills through practical training on the work site. Regular evaluations of the apprentice's knowledge and skills are conducted throughout training to ensure that all apprentices have achieved the learning outcomes identified in the curriculum standard.

It is not the intent of the in-school curriculum to perfect on-the-job skills. The practical portion of the in-school program is used to reinforce theoretical knowledge. Skill training is provided on the job.

Roofer

Level 1

Program Summary of Reportable Subjects - Level 1

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0961	Workplace Safety 1	36	18	18
S0962	Trade Documentation 1	36	36	0
S0963	Tools, Equipment and Materials 1	54	27	27
S0964	Roof Systems and Applications 1	78	19	59
S0965	Roof Maintenance 1	24	13	11
S0966	Sloped Roofing 1	12	7	5
	Total	**240**	**120**	**120**

Number: **S0961**

Reportable Subject: **WORKPLACE SAFETY 1**

Duration: Total 36 hours Theory 18 hours Practical 18 hours

Prerequisites:

Content:

S0961.1 General Safety 1
S0961.2 Rigging and Hoisting 1
S0961.3 Site Preparation 1

Evaluation & Testing: Objective tests, assignments and practical demonstrations including:

- rigging and hoisting practices
- hand signals
- development of safety manual
- safety inspection of a roofing site
- use of fire extinguishers
- site set-up for roofing application
- placement of ladders and scaffolds

S0961.1 General Safety 1

Duration: Total 16 hours Theory 8 hours Practical 8 hours

Cross Reference to Training Standards: U5216.1; 5216.2; 5216.3; 5216.4; 5216.5; 5216.6; 5216;7; 5216.8; 5216.12; 5216.13; 5216.14; 5216.15; 5216.16; 5216. 18

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to apply safe work practices and procedures, to ensure the protection of self and others during roofing applications in accordance with company policies, manufacturer's specifications, Construction and Safety Association of Ontario (CSAO), Workplace Hazardous Material Information System (WHMIS), government regulations and OHSA.

LEARNING OUTCOMES AND CONTENT

1.1 Introduction to the OHSA.

1.2 List roofing safety terms and their definitions.

1.3 Select personal protective clothing and equipment including:
- headgear, footgear, eye protection
- hearing protection
- long sleeve shirts and gloves
- goggles and face shields
- fall arrest protection systems
- types of respiratory protection

1.4 Interpret Material Safety Data Sheets (MSDS).

1.5 List items related to set-up safety.

1.6 List rules for refuelling.

1.7 List items related to setting up kettle.

1.8 Identify procedures to fire a kettle.

1.9 Identify procedures to hoist.

1.10 Identify basic hand signals for hoisting.

1.11 Describe ladder safety.

1.12 Describe deck safety.

1.13 Identify fire extinguishers, dry chemicals and fire fighting equipment for their intended functions.

1.14 Identify classes of fires and the method for extinguishing.

1.15 List steps in fighting bucket fires safely.

1.16 Describe how to handle and empty hot bitumen safely.

1.17 Name methods for safe control of hot bitumen emissions.

1.18 Identify electrical hazards including lightning safety.

1.19 Report potential hazards to supervisor or safety personnel.

1.20 Maintain roofing equipment:
- ladders
- scaffolding
- hoists
- gasoline powered equipment
- cables, ropes and attachments

1.21 Respond to emergency situations.

1.22 Report all accidents regardless how minor to company.

1.23 Install warning devices or barricades.

1.24 Lift manual loads to prevent injury.

1.25 Communicate with co-workers, clients and employers to ensure safe and hazard-free work area.

1.26 Practice safe working procedures by applying good housekeeping rules.

1.27 Practice safe use of hazardous materials.

1.28 Demonstrate procedures for installing guardrail type of warning barriers at perimeters to protect self and others.

1.29 Identify general safety around heat guns and open flame torches when working near adhesives and contact cement.

1.30 Describe procedures for establishing a fire watch after torching applications.

1.31 Discuss the impact to roofers of stress due to heat and cold.

S0961.2 Rigging and Hoisting 1

Duration: Total 16 hours Theory 8 hours Practical 8 hours

Cross Reference to Training Standards: U5219.1; U5219.2; U5219.3; U5219.4; U5218.10

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to demonstrate hoisting and rigging practices as outlined in the CSAO Rigging Manual, the Occupational Health and Safety Act (OHSA) and manufacturers' specification guidelines.

LEARNING OUTCOMES AND CONTENT

2.1 Describe how to tie off material and equipment lifts according to methods outlined in the CSAO Rigging manual.

2.2 Describe how to set-up manual and power hoists and counterweights away from doors and windows, according to the CSAO Rigging Manual, the OHSA and manufacturers' instructions.

2.3 Identify standard hand signals prescribed by the CSAO Rigging Manual to ensure effective communication and safety on the job site.

2.4 Describe how to set-up ladders and scaffolds including related braces, pins and attachments, in accordance with the OHSA, securing all components to ensure a safe working platform and access to the work area.

S0961.3 Site Preparation 1

Duration: Total 4 hours Theory 2 hours Practical 2 hours

Cross Reference to Training Standards: U5217.4; U5217.5; U5217.6; U5217.7; U5217.8; U5218.01; U5218.2; U5218.3; U5218.4

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to demonstrate site preparation procedures for a variety of roofing applications to ensure the protection of building, pedestrians and the property of others in accordance with Transport Canada, Ontario Ministry of Transportation regulations including transportation of dangerous goods.

LEARNING OUTCOMES AND CONTENT

3.1 Identify procedures for loading trucks to ensure safe work practices

3.2 Identify procedures for unloading trucks to ensure convenient access to materials and to avoid structural damage.

3.3 Identify measures to protect roofing materials to avoid unnecessary handling and to prevent damage from the elements.

3.4 Describe procedures for inspecting the work site to ensure that preparations are co-ordinated with other trades working at the site.

3.5 Identify scope of work prior to job start.

3.6 Identify location for placing material and equipment so as not to interfere with others and allow easy access to work areas

3.7 Conduct a visual inspection of the roof to identify potential problem areas:

- blisters, bridging, splits, cracks
- wind swept areas
- loose or deteriorated flashings
- skylights
- mechanical equipment (roof top units)
- drainage systems
- units, walkways
- piping support
- pitch pockets

3.8 Draw sketches to illustrate roof problems using trade terminology.

3.9 Conduct examination of roof surface to ensure that the substrate meets manufacturer's material specifications.

3.10 Perform a cut test to determine types and condition of materials and substrate.

3.11 Communicate with company officials in writing or orally to assist or determine materials and job costs.

Number: **S0962**

Reportable Subject: **TRADE DOCUMENTATION 1**

Duration: Total 36 hours Theory 36 hours Practical 0 hours

Prerequisites:

Content:

S0962.1 Applied Calculation 1
S0962.2 Architectural Drawings 1

Evaluation & Testing: Objective tests, assignments and practical demonstrations including:

- Fractions
- Ratio and Percentages
- Perimeters, Areas and Volumes
- Imperial Scales/Metric Scales
- 3-D Sketches
- Orthographic Drawing and Sections
- Symbols and Abbreviations

S0962.1 Applied Calculation 1

Duration: Total 12 hours Theory 12 hours Practical 0 hours

Cross Reference to Training Standards: U5217.1

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to complete mathematical calculations required in the roofing industry.

LEARNING OUTCOMES AND CONTENT

1.1 Add, subtract, multiply and divide whole numbers and fractions.

1.2 Calculate ratios and percentages using sample questions.

1.3 Calculate the perimeter and area of simple shapes using sample questions.

1.4 Calculate the perimeter and area of compound sloped roofs.

1.5 Determine the volume of simple shapes.

1.6 Calculate material quantities and weight for specific roofing applications.

1.7 Describe where and how metric measurement is used in the roofing industry.

S0962.2 Architectural Drawings 1

Duration: Total 24 hours Theory 24 hours Practical 0 hours

Cross Reference to Training Standards: U5217.1

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to visualize in three dimensions from two-dimensional drawings, and understand imperial and metric scales, orthographic projection, isometric sketching, and the symbols, abbreviations and conventions used in building plans.

LEARNING OUTCOMES AND CONTENT

2.1 Describe the origin of the blueprinting process.

2.2 Read an imperial scale and accurately measure items provided.

2.3 Read a metric scale and accurately measure items provided.

2.4 Accurately measure items drawn to scale using a tape measure.

2.5 Understand orthographic projection and accurately draw 5 views of an object: top, north, south, east and west views.

2.6 Sketch a three-dimensional isometric drawing of an object from three separate orthographic views.

2.7 Sketch a section of an object with a cutting plane line.

2.8 Interpret a simple floor plan and the lines and symbols found there.

2.9 Describe a building section related to the floor plan.

Number: **S0963**

Reportable Subject: **TOOLS, EQUIPMENT AND MATERIALS 1**

Duration: Total 54 hours Theory 27 hours Practical 27 hours

Prerequisites: S0961

Content:

S0963.1	Trade Orientation 1
S0963.2	Specifications 1
S0963.3	Tools and Equipment 1
S0963.4	Kettles and Tankers 1
S0963.5	Roof Types, Materials and Fasteners 1
S0963.6	Barriers and Insulation 1
S0963.7	Walkways and Ballast 1

Evaluation & Testing: Objective tests, assignments and practical demonstrations including:

- budget assignment
- interpretation of Manufacturer's specification for a Built-up Roof
- use of tools and equipment during specific projects
- techniques for lighting kettles
- determine roof slope and application limitations
- determine materials requirements for specific roof areas
- inspect and catalogue fasteners and roll roofing materials
- inspect on-site nailing and application techniques.
- install walkways and ballast.

S0963.1 Trade Orientation 1

Duration: Total 4 hours Theory 4 hours Practical 0 hours

Cross Reference to Training Standards:

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the development of the roofing industry and the scope of employment opportunities within that industry.

LEARNING OUTCOMES AND CONTENT

1.1 List roofing terms and their definitions

1.2 Explain the development of the industry, from its earliest beginnings to the present standards and applications.

1.3 Define standard terminology, and sources of information on roofing materials and practices.

1.4 Discuss the seasonal aspects of roofing

1.5 List expectations for beginning roofers

1.6 List career opportunities for advanced roofers

1.7 Discuss personal hygiene

1.8 Describe current regulations and government agencies involved in regulating the trade

1.9 Outline key aspects for developing employer/employee relationships.

1.10 List items that contribute to good customer relations

1.11 Plan a realistic personal budget to ensure consistent income 12 months of the year

S0963.2 Specifications 1

Duration: Total 3 hours Theory 3 hours Practical 0 hours

Cross Reference to Training Standards: U5217.1; U2527.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe roofing specifications and their use in planning and preparing for installations.

LEARNING OUTCOMES AND CONTENT

2.1 Interpret specification manuals to determine job details, application methods, requirements, materials, equipment.

2.2 Read manufacturers' product manuals to determine specific use, potential material hazards, recommended application methods and required tools to ensure the integrity of roofing installations and the protection of the manufacturer's warranty.

2.3 Describe the characteristics of different roof designs.

2.4 Use the job specifications as a quick reference tool.

S0963.3 Tools and Equipment 1

Duration: Total 17 hours Theory 7 hours Practical 10 hours

Cross Reference to Training Standards: U5220.1; U5220.2; U5220.4; U5220.6; U5220.7

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to select and use a variety of hand and power tools and other equipment to perform roofing applications, in accordance with the manufacturers' printed instructions and the OHSA.

LEARNING OUTCOMES AND CONTENT

3.1 List terms related to roofing tools and equipment and their definitions.

3.2 Identify hand tools for everyday use:
- hatchet
- chalk line
- yellow marking crayon
- utility knife
- retractable steel measuring tape
- roofer's tool belt
- nail bag
- 8" adjustable wrench

3.3 Identify hand tools for special jobs:
- roofer's tool bag
- handsaw
- nail bar
- assorted screwdrivers
- knee pads
- cold chisel
- combination tin snips
- hacksaw
- hand drill and steel bits
- hammer
- pointing trowel
- socket wrench and sockets

3.4 Identify general purpose tools:
- brooms
- scrapers
- spud bars
- weed burner
- pipe wrenches
- mops
- scoop
- wheelbarrow
- spade

3.5 Describe the types and uses of hand held torches.

3.6 Select and use various power tools to perform roofing applications in accordance with the manufacturers' instructions and safety guidelines:
- cut-off saws
- skills saws
- reciprocating saws
- heat guns
- generators
- drills
- screw guns

3.7 Set-up, operate and maintain various types of manually operated roof top equipment in accordance with the manufacturers' instructions and safety guidelines:
- hot lugger
- mop cart
- mini mopper
- felt layer
- gravel spreader
- taping machine

3.8 Set-up, operate and maintain various types of power operated roof top equipment in accordance with the manufacturers' instructions and safety guidelines:
- power roof sweeper
- power roof cutter
- power claw (power peeler)
- combination cutter/scratcher

3.9 Identify set-up procedures for various types of manually operated hoist:
- hand hoist
- ladder wheel hoist
- hand beam hoist

3.10 Identify set-up procedures for various types of power hoists:
- ladder platform hoist
- swing beam hoist
- overhead monorail hoist
- rail carriage hoist
- conveyers

3.11 Start and stop a small engine in accordance with the manufacturers' instructions and safety guidelines.

3.12 Identify regular maintenance and adjustment services on small engines:
- conduct a small engine pre-start check up (check the oil)
- clean the foam-type filter
- clean/replace spark plugs
- clean small engine cooling system (top fins)

S0963.4 Kettles and Tankers 1

Duration: Total 8 hours Theory 4 hours Practical 4 hours

Cross Reference to Training Standards: U5216.9; U5216.10; U5216.11

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to fire, drain and clean kettles and tankers.

LEARNING OUTCOMES AND CONTENT

4.1 List terms related to kettles and tankers and their definitions

4.2 Describe the sizes of kettles and their uses

4.3 Describe automatic and manual methods for firing kettles and tankers.

4.4 List two types of fuels used for firing kettles and tankers

4.5 Describe characteristics of various types of kettles

4.6 Describe terms related to tanker use in relation to their stated size

4.7 List the advantage of tankers over kettles

4.8 List two types of pumps

4.9 Describe the care of pumps

4.10 Describe the care of supply lines

4.11 Describe temperature controls

4.12 Describe emission control systems on smokeless kettles including safety loader.

4.13 Describe procedures for draining hot bitumen from kettles and tankers by transferring to containers in accordance with the OHSA and WHMIS guidelines.

4.14 Describe procedures for cleaning kettles and tankers, while ventilating with forced air in confined spaces, according to the OHSA and WHMIS guidelines and company policies.

S0963.5 Roof Types, Materials and Fasteners 1

Duration: Total 13 hours Theory 5 hours Practical 8 hours

Cross Reference to Training Standards: U5217.3; U5223.4; U5223.7; U5223.10; U5223.11; U5223.13; U5224.01; U5224.02; U5224.03; U5226.01; U5226.02; U5226.03

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the types of roofs, and the capability and suitability of roofing materials and fastening devices available for roofing applications.

LEARNING OUTCOMES AND CONTENT

5.1 List terms related to roofs and roofing materials and their definitions.

5.2 List three items determined by roof slope.

5.3 Describe how roof slope is determined and the impact of slope on roofing applications.

5.4 Identify traditional industrial and residential roof styles:
- flat
- barrel
- shed
- saw tooth
- serpentine
- hip
- gable
- gambrel
- mansard

5.5 List the various types of rolled roofing materials and describe their use in roofing applications:
- rag felt
- asphalt saturated felt
- tar felt
- glass felt
- mineral surface
- split sheet
- salvage edge
- rosin sheathing

5.6 Determine roll material requirements for a specific roof area.

5.7 List roofing nails and mechanical fasteners and their use.

5.8 Describe application procedures for various fastening devices according to manufacturers' specifications and design requirements, and safety guidelines:

- barbed roofing nails
- simplex-type cap nails
- annular capped roofing nails
- spiral capped roofing nails
- masonry (concrete) nails
- insulation clips
- staples
- metal screws with plates
- lead head nails
- copper nails
- neoprene washer nails
- nail-through caps
- neoprene washer screws

5.9 Describe nailing patterns.

5.10 Discuss nailing procedure.

5.11 Describe application procedures for aggregate used in roofing applications including:

- pea gravel
- marble chips
- crushed gravel
- slag
- round quarried gravel

5.12 Describe the uses of asphalt.

5.13 Discuss equiviscous temperature (EVT).

5.14 Define flash point.

5.15 List special precautions for heating bitumens

5.16 Identify types of roof coatings and their uses:
- aluminium paint
- emulsion
- decorative
- vinyl
- synthetic rubber
- cutback
- asphalt flood coat

5.17 identify types of sealants and their uses:
- caulking compounds
- mastic
- solvent
- coal tar pitch-base mastic
- plastic cement

5.18 Discuss cant strip.

5.19 Determine material requirements for specific roof areas.

5.20 Discuss installation of reflective roofing systems and roof-top garden roofs (green roofs) and vegetative roofs to meet environmental standards.

S0963.6 Barriers and Insulation 1

Duration: Total 7 hours Theory 3 hours Practical 4 hours

Cross Reference to Training Standards: U5223.02; U5223.03; U5223.15; U5224.06

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the characteristics of various insulation materials and vapour retarders for specific roofing applications.

LEARNING OUTCOMES AND CONTENT

6.1 List terms associated with insulation and their definitions.

6.2 List basic objectives of insulation.

6.3 List ways heat transfer takes place.

6.4 List ways insulation slows heat transfer.

6.5 List thermal factors and values and their definitions.

6.6 Describe how insulation is evaluated, and factors which determine the selection of insulation materials.

6.7 List important physical properties of insulation and their definitions.

6.8 Describe the advantages and disadvantages of various types of organic and inorganic insulation, taking into consideration the physical properties of each type:

- fibreboard
- polystyrene (expanded or extruded)
- polyurethane
- perlite
- fibrous glass
- cellular glass
- polyisocyanurate
- phenolic
- mineral wool

6.9 Describe the characteristics of composite board roof insulation.

6.10 Describe the use of urethane foam spray insulation.

6.11 Discuss handling and application procedures for rigid insulation materials:
- breaking joints
- taping joints
- nailing and fastening insulation
- adhesives

6.12 List special precautions for insulation on a steel deck.

6.13 Describe the use of vapour retarders, vapour barriers and air barriers.

6.14 Discuss the use of tapered roof insulation systems.

6.15 Describe use of ballast over insulation.

S0963.7 Walkways and Ballast 1

Duration: Total 2 hours Theory 1 hour Practical 1 hour

Cross Reference to Training Standards: U5224.5; U5224.6

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe procedures for installing various types of walkways and protective ballast.

LEARNING OUTCOMES AND CONTENT

7.1 Identify types of walkways:
- patio stones
- pressure-treated lumber
- PVC roof treads and rubber walkway material
- pedestals
- asphalt roof treads

7.2 Discuss procedures for installing walkways according to drawings and specifications, the CRCA manual and safety guidelines.

7.3 Identify types of materials used as protective surface and/or ballast in roofing applications:
- protective filter mat/blanket
- protection board/insulation
- patio stones
- aggregate
- extruded polystyrene

7.4 Install protective surface and/or ballast to protect the roofing system from wind, ultraviolet radiation and weathering according to manufacturers' instructions and drawings and specifications.

7.5 Identify surfacings for foot and vehicular traffic and their characteristics

7.6 Describe installation requirements for walkways and traffic pads

Number: **S0964**

Reportable Subject: **ROOF SYSTEMS AND APPLICATIONS 1**

Duration: Total 78 Hours Theory 19 hours Practical 59 hours

Prerequisites:

Content:

S0964.1	Flashing Membranes 1
S0964.2	Metal Flashings 1
S0964.3	Types Of Membranes 1 – Built-Up Roofing
S0964.4	Types Of Bitumen 1 - Built-Up Roofing
S0964.5	Field Sheets and Flashings 1 – Single-Ply Roofing
S0964.6	Base Sheets and Flashings 1 – Two-Ply Roofing
S0964.7	Cap Sheets and Flashings 1 – Two-Ply Roofing

Evaluation & Testing: Objective tests, assignments and practical demonstrations including:

- use of membrane flashing
- counter-flashing curb, parapet and gravel stop with galvanized metal
- interpret manufacturer's specification for a built-up roof
- handle asphalt, mastic and aggregate
- skill with base sheets and flashing
- installation of cap sheets and flashing

S0964.1 Flashing Membranes 1

Duration: Total 7 hours Theory 3 hours Practical 4 hours

Cross Reference to Training Standards: U5223.9

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe procedures involved in the installation of flashing membranes in various roofing applications.

LEARNING OUTCOMES AND CONTENT

2.1 Identify types of flashing materials used in roofing applications including:
- fibrous glass
- synthetic membrane flashing (neoprene, butyl, PVC)
- organic and inorganic felt
- PVC membrane flashing
- SBS-APP (Mod. Bitumen) flashing
- EPDM membrane flashing
- TPO membrane flashing

1.2 Describe installation procedures for the various types of membrane flashings:
- adhesive
- compounds
- heat guns
- open flame
- mopping
- mechanically fastened

1.3 Describe procedures for installing membrane flashings for walls, perimeters, curbs, projections, expansion and control joints, pitch boxes, sleeves, drains and scuppers, in accordance with drawings, specifications, manufacturers' guidelines and the CRCA manual.

S0964.2 Metal Flashings 1

Duration: Total 8 hours Theory 2 hours Practical 6 hours

Cross Reference to Training Standards: U5223.12

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe application procedures for metal flashings in various roofing applications.

LEARNING OUTCOMES AND CONTENT

2.1 Discuss the various types of metal flashings used in roofing applications:
- galvanized steel
- aluminium
- copper
- lead
- special metals
- repainted galvanized
- PVC coated metals

2.2 Identify roofing applications where metal flashings are used.

2.3 Describe the characteristics of various designs in metal flashing including gravel stops, parapets, cants and curbs.

2.4 Demonstrate flashing procedure for curbs, parapets, and gravel stops.

2.5 Discuss the use of reglets in masonry walls.

2.6 Demonstrate, using non-painted 30 gauge galvanized metal to make:
- gravel stops
- inside corners with standing seam
- outside corner with standing seam
- curbs for units or skylights with standing seam

S0964.3 Types Of Membranes 1 – Built-Up Roofing

Duration: Total 16 hours Theory 5 hours Practical 11 hours

Cross Reference to Training Standards: U5223.8; U5223.9; U5223.10

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the various types of membranes and application procedures for built-up roofing, in accordance with drawings and specifications, manufacturers' guidelines and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

3.1 List built-up roof membranes and their definitions.

3.2 Identify the components of a built-up roof.

3.3 Describe procedures for identifying the number of plies in a built-up roof.

3.4 Describe procedures for storing and handling built-up roof materials.

3.5 Describe how to protect the roof membrane from sun damage, temperature extremes, wind, and fire.

3.6 Discuss procedures for installing the various components of the built-up roof in accordance with drawings and specifications, manufacturers' guidelines and the CRCA manual.

3.7 Identify the different types and combinations of felts in a built-up roof application.

3.8 List the steps in using ply lines to cut four-ply starter strips.

3.9 Explain procedures for applying starter strips on a four-ply built-up roof.

3.10 List general rules for applying materials.

3.11 List ways to determine the starting point of a built-up roof.

3.12 List in order the steps in starting a built-up roof at a drain.

3.13 List in order the steps in starting a built-up roof at an eave.

3.14 List in order the procedure for machine application of felts.

3.15 List in order the steps in applying membrane flashing on a parapet wall.

3.16 List in order the steps in applying basic gravel stop.

3.17 List types of scuppers and arrange in order the steps in installation.

3.18 List in order the steps in applying flood coating.

3.19 List in order the steps in graveling in by hand.

3.20 List in order the steps in graveling in with a machine.

3.21 Demonstrate:

- inspect and set-up kettle
- light up kettle
- locate and place propane cylinders
- mop rolls of felt
- throw in rolls of felt
- mop perimeters with 4" cant strips
- membrane flash perimeters with felt on a 4" cant strip

S0964.4 Types Of Bitumen 1 - Built-Up Roofing

Duration: Total 6 hours Theory 1 hour Practical 5 hours

Cross Reference to Training Standards: U5223.08

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to develop in the apprentice knowledge of the various types of bitumen and application procedures for built-up roofing, in accordance with drawings and specifications, manufacturers' guidelines and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

4.1 Identify various types and distinguishing characteristics of bitumen:
- Asphalt -- Types I, II, III, Rubberized, Modified
- Pitch -- Type I

4.2 Identify uses for the different types of bitumen and their limitations.

4.3 Identify personal safety considerations for heating and working with hot bitumen.

4.4 Describe specific procedures for applying bitumen as part of a built-up roofing application.

4.5 Identify equivicious temperatures.

4.6 Identify flash point.

4.7 Demonstrate mopping and brooming techniques for working with hot bitumen.

4.8 Describe the use of cold process adhesive/bitumen for built-up roofing applications.

S0964.5 Field Sheets and Flashings 1 – Single-Ply Roofing

Duration: Total 23 hours Theory 5 hours Practical 18 hours

Cross Reference to Training Standards: U5224.1; U5224.2; U5224.3; U5224.4

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the various types of field sheets and flashings (EPRS) and their application in single ply roofing, in accordance with drawings and specifications, manufacturers' guidelines and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

5.1 List terms related to the introduction to single-ply roofing systems and their definitions.

5.2 Complete a list of historical notes concerning single ply roofing systems.

5.3 List general types of single-ply roofing systems and their application requirements.

5.4 Identify single-ply roof membrane systems and their characteristics including:
EPDM - (Ethylene propylene diene monomer) roof membrane system
NEO - (Neoprene) polychloroprene roof membrane
PVC - Polyvinyl chloride roof membrane system
TPO - Thermoplastic Polyolefin (Hyphalon)
CSPE - Chlorosulphanated polyethylene
PIB - Polyisobutylene roof membrane system

5.5 List specific single-ply roofing membrane systems and their definitions.

5.6 List specific single-ply roof membrane systems and their characteristics.

5.7 Discuss application methods for totally adhered systems.

5.8 Discuss application procedures for loose laid and ballasted systems.

5.9 Discuss application procedures for mechanically fastened systems.

5.10 Seal side laps and end joints of field sheets to ensure a watertight seal, free of air pockets, voids, fishmouths, blistering, wrinkles, scorching.

5.11 Describe the characteristics of contact adhesives and cements.

5.12 Describe methods of heat welding and their characteristics.

5.13 Describe types of single-ply roofing systems and their characteristics.

5.14 Explain weather and temperature considerations for single-ply roofing system applications.

5.15 Describe the importance of workmanship with single-ply roofing systems.

5.16 Seal roof perimeters and projections, including pitch pockets, gravel stops, pipe flashing, wall flashing, and outside and inside corners.

5.17 Clean the work site of debris during and after completion to ensure a safe working environment.

5.18 Demonstrate:

using PVC / TPO	**using EPDM**
operate heat gun	recognize when contact cement has flashed off
weld straight seams	do a single pipe flange, a double pipe flange, and a triple pipe flange
make basic pipe flanges	wrap an inside and outside corner and a repair patch
weld inside and outside non canted corners and repair patch	do straight seams with adhesives/tapes as a group project
layout and wrap b vent tall cone flange as a group project	layout and wrap b vent tall cone flange as a group project

S0964.6 Base Sheets and Flashings 1 – Two-Ply Roofing

Duration: Total 8 hours Theory 1 hour Practical 7 hours

Cross Reference to Training Standards: U5226.1; U5226.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe application of base sheets and flashing in two-ply roofing, in accordance with drawings and specifications, manufacturers' guidelines, building codes and by-laws and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

6.1 Describe terms used with a modified bitumen roofing system

6.2 Identify types of base sheets.

6.3 Describe the application procedures for a modified bitumen roofing system.

6.4 Discuss applications procedures for various types of base sheets to ensure that the seal is watertight and the sheets are straight and true with no fishmouths, wrinkles, or damage.

6.5 Identify types of base flashing.

6.6 Install base sheets and base sheet flashings.

6.7 Discuss and identify the application methods using asphalt, gas propane torch, cold adhesives and mechanical fasteners with regards to the substrate.

6.8 Demonstrate:
- light and adjust flame on torches
- torch base field sheets on flat roofs
- torch base flashing on 4" cant strip perimeter

6.9 Discuss hazards associated with torch applied roofing systems and procedures required to establish a fire watch.

S0964.7 Cap Sheets and Flashings 1 – Two-Ply Roofing

Duration: Total 10 hours Theory 2 hours Practical 8 hours

Cross Reference to Training Standards: U5226.2; U5226.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe application of cap sheets and flashing in two-ply roofing, in accordance with drawings and specifications, manufacturers' guidelines, building codes and by-laws and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

7.1 Explain terms used with a modified bitumen roofing system.

7.2 Identify the application procedure for a modified bitumen roofing system.

7.3 Identify types of cap sheets.

7.4 Discuss application procedures for various types of cap sheets to ensure that the finished installation is aesthetically pleasing and completed according to manufacturers' instructions and drawings and specifications.

7.5 Identify types of cap flashing.

7.6 Demonstrate how to:

- light and adjust flame on torches
- identify reasons for using torches in the hand
- torch cap field sheets on flat roof
- torch cap flashing on a 4" cant strip perimeter
- do corner appearance on a 4" cant strip

7.7 Discuss hazards and procedures required to establish a fire watch.

Number:	**S0965**
Reportable Subject:	**ROOF MAINTENANCE 1**
Duration:	Total 24 Hours Theory 13 hours Practical 11 hours
Prerequisites:	S0961; S0962; S0963; S0964
Content:	S0965.1 Stripping 1 S0965.2 Re-roofing and Resurfacing 1 S0965.3 Roof Repair 1 S0965.4 Water and Damp Proofing 1
Evaluation & Testing:	Objective tests, assignments and practical demonstrations

S0965.1 Stripping 1

Duration: Total 4 hours Theory 2 hours Practical 2 hours

Cross Reference to Training Standards: U5218.11; U5218.12; U5218.13; U5218.14; U5218.15; U5218.16; U5218.17

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to strip a roof in preparation for roofing applications, to ensure the protection of building, grounds and the property of others, in accordance with local regulations and company policy.

LEARNING OUTCOMES AND CONTENT

1.1 Describe how to set-up equipment for roof removal.

1.2 Describe the installation of interior and exterior building protection to avoid damage to clients' property through dust and debris.

1.3 Describe closing and opening procedures of building orifices to prevent debris and fumes from entering the building.

1.4 Describe how to protect skylights or windows from damage during stripping.

1.5 Remove loose gravel and debris.

1.6 Cut and remove roof membrane to expose substrate.

1.7 Clean the work site of debris during and after completion.

S0965.2 Re-roofing and Resurfacing 1

Duration: Total 6 hours Theory 3 hours Practical 3 hours

Cross Reference to Training Standards: U5222.3; U5222.4; U5222.5

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe re-roofing and resurfacing procedures in accordance with manufacturers' instructions and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

2.1 List terms related to re-roofing and their definitions.

2.2 List ways to determine the need for re-roofing.

2.3 List ways to determine the extent of re-roofing needed.

2.4 Describe procedures for tearing off a gravel roof.

2.5 List in order the procedure for setting up a chute.

2.7 List in order the steps in removing gravel with a scratcher.

2.8 List ways of starting a recover roof over an old roof.

2.9 List steps in re-roofing an old smooth-surface roof.

2.10 List ways to peel roof membrane from old insulation.

2.11 List hazards in tear-off operations.

2.12 List ways to avoid hazards with electrical conduit and connections.

2.13 Describe closing and opening procedures of building orifices to prevent debris and fumes from entering the building.

2.14 Describe how to protect skylights or windows from damage while re-roofing.

2.15 Identify the importance of priming the old membrane in resurfacing applications.

2.16 Describe the importance of verifying deck slope and condition in re-roofing applications.

2.17 Clean the work site of debris during and after completion.

S0965.3 Roof Repair 1

Duration: Total 6 hours Theory 4 hours Practical 2 hours

Cross Reference to Training Standards: U5222.1; U5222.2; U5222.3; U5222.4

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe procedures for the completion of a variety of roof repairs, in accordance with manufacturers' instructions and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

3.1 Terms related to checking and repairing flat roofs and their definitions.

3.2 List common causes of leaks in a built-up roof system

3.3 List ways to isolate potential areas of leaking.

3.4 List steps in relating inside clues to outside problems.

3.5 List three situations that present special problems in finding leaks.

3.6 Describe the steps in temporary dry patching.

3.7 List three steps in temporary wet patching in the rain.

3.8 List reasons for learning leak location and repairs.

3.9 Discuss compatibility between materials to ensure complete roof repairs.

3.10 Describe how to remove existing flashing to provide access to roof for repairs.

3.11 Describe how to remove saturated or damaged insulation to ensure that areas of the roof are ready for roofing applications.

3.12 Assess the roofing area to determine the suitability of temporary or permanent roof repair in order to obtain the cost efficiency of repairs and possible life expectancy.

3.13 Perform roof repairs following drawings and specifications or company guidelines and clients' requests.

3.14 Clean the work site of debris during and after completion of repairs.

S0965.4 Water and Damp Proofing 1

Duration: Total 8 hours Theory 4 hours Practical 4 hours

Cross Reference to Training Standards: U5221.1; U5221.2; U5221.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe procedures for water and damp proofing applications following drawings and specifications, and manufacturers' instructions.

LEARNING OUTCOMES AND CONTENT

4.1 List terms related to damp proofing and waterproofing and their definitions.

4.2 List steps in preparing for damp proofing and waterproofing.

4.3 Discuss waterproofing techniques while working in confined areas and trenches.

4.4 Discuss the importance of a clean substrate and primer for adhesion of the membrane.

4.5 List safety factors to be considered in damp-proofing and waterproofing applications.

4.6 Match materials used in damp proofing and waterproofing with their definitions or uses.

4.7 Describe the characteristics of SBS and APP modifieds.

4.8 Apply reinforcing damp-proofing and waterproofing membrane for the application, following drawings and specifications, and manufacturers' instructions.

4.9 Describe the steps in damp proofing with asphalt.

4.10 Describe the steps in damp proofing with emulsion.

4.11 List characteristics of bitumastic.

4.12 Describe the steps for special applications on porous concrete.

4.13 Describe the steps in applying butyl and other synthetics to walls.

4.14 Perform water and flood tests to confirm the watertight integrity of the membrane.

4.15 Apply protection boards for the application, following drawings and specifications, and manufacturers' instructions.

Number:	**S0966**
Reportable Subject:	**SLOPED ROOFING 1**
Duration:	Total 12 Hours Theory 7 hours Practical 5 hours
Prerequisites:	S0961; S0962; S0963
Content:	S0966.1 Installation – Shingles, Tiles, Rigid Material 1 S0966.2 Repair – Shingles, Tiles, Rigid Material 1
Evaluation & Testing:	Objective tests, assignments and practical demonstrations

S0966.1 Installation – Shingles, Tiles, Rigid Material 1

Duration: Total 8 hours Theory 4 hours Practical 4 hours

Cross Reference to Training Standards: U5225.01; U5225.02; U5225.03; U5225.04; U5225.05

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe installation procedures for shingles, tiles and preformed rigid sheeting materials, in accordance with drawings, specifications, manufacturers' guidelines, building codes and by-laws, CSAO, the CRCA manual, the OHSA, WHMIS guidelines and clients' requests.

LEARNING OUTCOMES AND CONTENT

1.1 List terms related to steep roofing with asphalt shingles and their definitions.

1.2 Describe elements of roof selection and their significance.

1.3 Describe minimum slope requirements in relation to specific roofing applications.

1.4 Identify basic types of asphalt shingles.

1.5 Identify various types of shingle, tile and rigid sheeting materials used in roofing applications:
- asphalt
- cedar shakes
- slate
- tile
- pre-formed shingles and sheets

1.6 Install eaves protection, underlayments, drip edges, and starter strips, valleys and saddles to ensure protection of eaves from water and ice backup and to prevent water damage to the substrate.

1.7 Describe the procedure for applying the starter course of asphalt shingles.

1.8 List guidelines for applying shingles to hips and ridges.

1.9 Fasten, trim, cut and fit asphalt shingles, step flashing, ridge and hip caps including low slope and conventional types, to ensure a watertight covering, spacing overlap, and alignment of shingles.

1.10 Discuss the importance of ventilation and insulation within the attic space and cathedral style construction.

S0966.2 Repair – Shingles, Tiles, Rigid Material 1

Duration: Total 4 hours Theory 3 hours Practical 1 hour

Cross Reference to Training Standards: U5225.06

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe repair procedures for shingles, tiles and preformed rigid sheeting materials, in accordance with drawings, specifications, manufacturers' guidelines, building codes and by-laws, CSAO, the CRCA manual, the OHSA, WHMIS guidelines and clients' requests.

LEARNING OUTCOMES AND CONTENT

2.1 Perform tie-ins and repairs on shingle to achieve a watertight seal, spacing, overlaps and an aesthetically pleasing appearance.

2.2 Identify compatible materials for repair.

Roofer

Level 2

Program Summary of Reportable Subjects - Level 2

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0967	Workplace Safety 2	36	16	20
S0968	Trade Documentation 2	36	36	0
S0969	Tools, Equipment and Materials 2	48	23	25
S0970	Roof Systems and Applications 2	84	24	60
S0971	Roof Maintenance 2	24	13	11
S0972	Sloped Roofing 2	12	6	6
	Total	**240**	**118**	**122**

Number:	**S0967**
Reportable Subject:	**WORKPLACE SAFETY 2**
Duration:	Total 36 hours Theory 16 hours Practical 20 hours
Prerequisites:	S0961
Content:	S0967.1 General Safety 2 S0967.2 Rigging and Hoisting 2 S0967.3 Site Preparation 2
Evaluation & Testing:	Objective tests, assignments and practical demonstrations including: - site set-up for a roofing application

S0967.1 General Safety 2

Duration: Total 18 hours Theory 8 hours Practical 10 hours

Cross Reference to Training Standards: U5216.1; 5216.2; 5216.3; 5216.4; 5216.5; 5216.6; 5216;7; 5216.8; 5216.12; 5216.13; 5216.14; 5216.15; 5216.16; 5216.17; 5216. 18

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe safe working practices and procedures to ensure the protection of self and others during roofing applications in accordance with WHMIS, OHSA and the Construction Safety Association of Ontario (CSAO):

LEARNING OUTCOMES AND CONTENT

1.1 List terms related to general safety requirements for elasto-plastic roofing system (EPRS) equipment and materials and their definitions.

1.2 List terms related to use of tools and equipment and their definitions.

1.3 Select personal protective clothing and equipment including:
- headgear, footgear, eye protection
- hearing protection
- long sleeve shirts and gloves
- goggles and face shields
- fall arrest protection systems
- types of respiratory protection

1.4 Interpret Material Safety Data Sheets (MSDS).

1.5 Complete a list of fire hazards with solvent-based adhesives.

1.6 Describe safety rules for propane torches.

1.7 Describe procedures for establishing a fire watch after torching applications.

1.8 Describe safety rules for handling propane bottles.

1.9 Complete a list of safety rules for heat guns.

1.10 Describe slipping hazards when using EPRS materials.

1.11 Complete a list of solvent uses and solvent hazards.

1.12 Select true statements concerning health hazards associated with exposure to solvents.

1.13 Describe ways solvents enter the body in relation to health hazards.

1.14 List six specific ways to guard against solvent exposure.

1.15 Solve problems associated with EPRS.

1.16 Describe procedures for using and maintaining felt machines, mini-moppers and hot dispensers.

1.17 Describe procedures for safe use of wheelbarrows, and other wheeled equipment on the roof.

1.18 Describe procedures for safe use of powered roof sweeping equipment.

1.19 Describe procedures for safe use of roof scrapers in re-roofing applications.

1.20 Identify the rules for working safely around high-lift trucks, and using forklifts and pallets.

1.21 Complete a list of ways to handle tire problems on felt layers and hot dispensers.

1.22 Describe procedures for working wheeled equipment safely on the roof.

1.23 State the major problem with chain mops and its solution.

1.24 Select from illustrations the position for a drain cock after the carrier has been cleaned and positioned.

1.25 Differentiate between highboy and lowboy carriers.

1.26 Complete a list of rules for safe operation of continuous-belt conveyors.

1.27 Describe safety rules for working with hot carriers.

1.28 Discuss the impact to roofers of stress due to heat or cold.

1.29 Describe procedures for safe use of powered spray equipment.

1.30 Demonstrate procedures for installing perimeter-guarding systems, warning lines and guardrails.

1.31 Practice safe working procedures by applying good housekeeping rules.

1.32 Use hazardous materials.

1.33 Describe procedures for safe use of liquid and vapour propane tanks and burners.

1.34 Identify fire extinguishers, dry chemicals and fire fighting equipment for their intended functions.

1.35 Complete a list of safe hoisting practices for all hand-operated hoists.

1.36 Identify all parts of a monorail hoist.

1.37 Identify two frequently used accessories for monorail hoists.

1.38 Identify all parts of a swing beam hoist.

S0967.2 Rigging and Hoisting 2

Duration: Total 12 hours Theory 6 hours Practical 6 hours

Cross Reference to Training Standards: U5219.1; U5219.2; U5219.3; U5219.4; U5219.5; U5218.10; U5218.11

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe hoisting and rigging practices as outlined in the CSAO Rigging Manual, the OHSA, and manufacturers' specification guidelines.

LEARNING OUTCOMES AND CONTENT

2.1 Set up manual and power hoists using counterweights.

2.2 Calculate the weight and size of the load.

2.3 Describe how to set up garbage chutes, hoppers, outriggers and required counterweights and tiebacks to remove roofing materials and debris.

2.4 Describe how to set up and operate conveying equipment, including outriggers and related components.

S0967.3 Site Preparation 2

Duration: Total 6 hours Theory 2 hours Practical 4 hours

Cross Reference to Training Standards: U5217.4; U5217.5; U5217.6; U5217.7; U5217.8; U5218.01; U5218.2; U5218.3; U5218.4

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe procedures at the site in preparation for a variety of roofing applications to ensure the protection of building, pedestrians and the property of others, in accordance the OHSA..

LEARNING OUTCOMES AND CONTENT

3.1 Identify potential dangers during site set-up.

3.2 Identify different types of protection to use for pedestrians/other trades at ground level.

3.3 Identify different types of protection to use for pedestrians/other trades at roof level.

3.4 Identify safe and practical area to set-up equipment ensuring and respecting the property of others.

Number:	**S0968**
Reportable Subject:	**TRADE DOCUMENTATION 2**
Duration:	Total 36 hours Theory 36 hours Practical 0 hours
Prerequisites:	S0962
Content:	S0968.1 Applied Calculations 2 S0968.2 Architectural Drawings 2
Evaluation & Testing:	Objective tests, assignments and practical demonstrations

S0968.1 Applied Calculations 2

Duration: Total 12 hours Theory 12 hours Practical 0 hours

Cross Reference to Training Standards: U5217.1

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to complete mathematical calculations required in the roofing industry.

LEARNING OUTCOMES AND CONTENT

1.1 Add, subtract, multiply and divide whole numbers and fractions.

1.2 Calculate ratios and percentages using sample questions.

1.3 Calculate the perimeter and area of complex shapes using sample questions.

1.4 Calculate the perimeter and area of compound sloped roofs.

1.5 Determine the volume of complex shapes.

1.6 Calculate material quantities and weight for specific roofing applications.

1.7 Describe where and how metric measurement is used in the roofing industry.

S0968.2 Architectural Drawings 2

Duration: Total 24 hours Theory 24 hours Practical 0 hours

Cross Reference to Training Standards: U5217.1; U5217.2

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able interpret more complex drawings and locate items in the architectural, structural, mechanical and electrical drawings that relate to the roofing application.

LEARNING OUTCOMES AND CONTENT

2.1 Identify the lines and symbols used in an architectural drawing.

2.2 Read a title block and use it accurately to answer specific questions.

2.3 Use cross reference symbols and notes to extract information from a plan.

2.4 Interpret the architectural drawings of a complex building.

2.5 Interpret the structural drawings of a complex building and relate them to the architectural drawings and the roof plan.

2.6 Interpret the mechanical and electrical drawings of a complex building and relate them to the architectural drawings and the roof plan.

2.7 Interpret specifications, revisions and addendum.

2.8 Interpret the building sections relating to the architectural, structural, mechanical and electrical drawings of a complex structure.

Number: **S0969**

Reportable Subject: **TOOLS, EQUIPMENT AND MATERIALS 2**

Duration: Total 48 hours Theory 23 hours Practical 25 hours

Prerequisites: S0963; S0967

Content:

S0969.1	Trade Orientation 2
S0969.2	Specifications 2
S0969.3	Tools and Equipment 2
S0969.4	Kettles and Tankers 2
S0969.5	Roof Types, Materials and Fasteners 2
S0969.6	Barriers and Insulation 2
S0969.7	Walkways and Ballast 2

Evaluation & Testing: Objective tests, assignments and practical demonstrations including:

- use of tools and equipment during specific projects
- techniques for firing, draining and cleaning kettles
- securing the end of a rope with whipping
- installing cable clips on a wire rope
- tying basic knots: square knot; single sheet bend; figure eight knot
- tying bowline knots
- tying basic hitches: half hitch; double half hitch; snubbing hitch; clove hitch; timber hitch
- assembling and disassembling a monorail hoist
- assembling and disassembling a swing beam hoist
- assembling a ladder platform hoist
- cutting insulation
- breaking joints
- cutting around pipe protrusions and around curbs or boxes
- cutting and fitting insulation in a corner that is other than a right angle
- apply and patch vapour retarder on a steel deck
- installation of walkways and ballast

ROOFER - LEVEL 1 AND 2

S0969.1 Trade Orientation 2

Duration: Total 2 hours Theory 2 hours Practical 0 hours

Cross Reference to Training Standards: None

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the trade science of roofing practices and procedures.

LEARNING OUTCOMES AND CONTENT

1.1 Describe how factory mutual, underwriters' laboratory and the Ontario Building Code influence the specifications on roofing and the methods of installation

1.2 Describe how roofs can be designed differently with new state of the art materials

1.3 Describe the principles of humidity and heat flow as they apply to roofing applications and suggest approaches for avoiding leakage and dew point.

1.4 Explain the properties rating and load bearing capabilities of insulating products commonly used in the roofing trade.

1.5 Describe how dissimilar metals used in roofing applications react to each other.

S0969.2 Specifications 2

Duration: Total 3 hours Theory 3 hours Practical 0 hours

Cross Reference to Training Standards: U5217.1; U2517.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe roofing specifications and their use in planning and preparing for installations.

LEARNING OUTCOMES AND CONTENT

2.1 Interpret specification manuals to determine job details, application methods, requirements, materials, equipment.

2.2 Interpret specifications to identify scope of work.

2.3 Read manufacturers' product manuals to determine specific use, potential material hazards, recommended application methods and required tools to ensure the integrity of roofing installations and the protection of the manufacturer's warranty.

2.4 Interpret general or supplementary conditions associated with scope of work.

S0969.3 Tools and Equipment 2

Duration: Total 17 hours Theory 7 hours Practical 10 hours

Cross Reference to Training Standards: U5220.4; U5220.5; U5220.6; U5220.7

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to select and use a variety of power tools and other equipment to perform roofing applications, in accordance with the manufacturers operating and maintenance instructions, safety guidelines and the OHSA.

LEARNING OUTCOMES AND CONTENT

3.1 Discuss set-up, operating and maintenance requirements for spray equipment, including components and controls, for the application of primer, paints, adhesives and coatings to condition surfaces, enhance the bonding of roofing materials, and protect waterproof membranes and surfaces from ultra-violet radiation.

3.2 Describe how to set up, and operate air compressors and pneumatic tools.

3.3 Describe how to set up, and operate internal combustion engines, attachments and components.

3.4 Describe how to set up and operate torching equipment.

3.5 Describe and demonstrate mopping techniques.

3.6 Identify uses for brushes, brooms and squeegees.

3.7 Assemble various types of mops:
- fibreglass
- cotton
- bell-type cotton

S0969.4 Kettles and Tankers 2

Duration: Total 7 hours Theory 3 hours Practical 4 hours

Cross Reference to Training Standards: U5216.9; U5216.10; U5216.11; U5216.17

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to perform procedures for use of kettles and tankers in accordance with the OHSA and regulations, WHMIS guidelines and company policies.

LEARNING OUTCOMES AND CONTENT

4.1 Fire kettles and tankers, using both automatic and manual methods.

4.2 Drain hot bitumen from kettles and tankers by transferring to containers.

4.3 Clean kettles and tankers, while ventilating with forced air in confined spaces.

4.4 Describe delivery of hot bitumen from kettle or tanker to roof.

4.5 Maintain emission control systems on smokeless kettles.

S0969.5 Roof Types, Materials and Fasteners 2

Duration: Total 13 hours Theory 5 hours Practical 8 hours

Cross Reference to Training Standards: U5223.04; U5223.07; U5223.08; U5224.02; U5224.03; U5226.01; U5226.02; U5226.03

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the characteristics of roofing materials and fastening devices for built-up roofing and EPRS applications.

LEARNING OUTCOMES AND CONTENT

5.1 List terms related to manufacture and handling of BUR products and their definitions.

5.2 Differentiate between asphalt and pitch.

5.3 Describe how processing affects asphalt properties.

5.4 Describe special considerations concerning the incompatibility of asphalt and pitch.

5.5 Identify physical methods for distinguishing pitch from asphalt and their processes.

5.6 Describe characteristics of mastic and their significance.

5.7 Complete a list of ways to avoid waste when handling or using mastic.

5.8 Complete a list of ways that aggregate contributes to a good built-up roof.

5.9 Describe types of aggregate and their sources.

5.10 Discuss uses of resaturants and their design properties:
- asphalt resaturant
- coal tar resaturant

5.11 Describe types of glass fibre felts and their characteristics including:
- Type IV
- Type VI

5.12 Discuss elasto-plastic roof systems and methods of application and attachment as roofing membranes.

5.13 Describe the use of roofing adhesives and cements.

5.14 Discuss modified bitument roof systems and methods of application and attachment as roofing membranes.

5.15 Discuss installation of reflective roofing systems and roof-top garden roofs (green roofs)/vegetated roofs to meet environmental standards.

S0969.6 Barriers and Insulation 2

Duration: Total 4 hours Theory 2 hours Practical 2 hours

Cross Reference to Training Standards: U5223.02; U5223.03; U5223.15; U5224.06

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the characteristics of rigid insulation materials and vapour retarders for specific roofing applications.

LEARNING OUTCOMES AND CONTENT

6.1 List terms related to vapour retarders, vapour barriers, air barriers and their definitions.

6.2 Explain why vapour retarders require careful application.

6.3 Complete a list of general rules about vapour retarders, vapour barriers and air barriers.

6.4 Describe general rules for vapour retarder application.

6.5 Describe procedures to avoid problems when applying vapour retarders.

6.6 List terms related to rigid insulation and their definitions.

6.7 Discuss procedures for placing rigid insulation into adhesive or bitumen in a variety of roofing applications.

6.8 Discuss the advantages of installing rigid insulation in two layers with staggered joints.

6.9 Describe problems caused by improper butting of rigid insulation.

6.10 List in order the steps applying rigid insulation over polystyrene.

6.11 Describe procedures for mechanically fastening insulation to a steel deck using electrically powered and pneumatic tools.

6.12 Describe types of powered tools for applying mechanically fastened insulation on a steel deck and their characteristics.

6.13 Describe the steps in preparation and removal of temporary water cutoffs on insulation.

6.14 List in order the steps in cutting very thick insulation.

6.15 Describe the method for replacing damaged rigid insulation.

6.16 Demonstrate procedures for breaking joints in the application of rigid insulation.

6.17 Cut rigid insulation for pipe protrusions and boxes.

6.18 Cut insulation for corners with other than right angles.

6.19 Discus the effects of thermal bridging.

S0969.7 Walkways and Ballast 2

Duration: Total 2 hours Theory 1 hour Practical 1 hour

Cross Reference to Training Standards: U5224.5; U5224.6

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to install various types of walkways and protective ballast according to manufacturers' instructions and drawings and specifications.

LEARNING OUTCOMES AND CONTENT

7.1 Identify types of walkways and their application to the different types of roofs.

7.2 Identify reasons for installing roof treads.

7.3 Identify the importance of installing roof treads around mechanical units.

7.4 Identify use of protective surface.

7.5 Install protective surface and/or ballast to protect the roofing system from wind, ultraviolet radiation and weathering.

Number: **S0970**

Reportable Subject: **ROOF SYSTEMS AND APPLICATIONS 2**

Duration: Total 84 hours Theory 24 hours Practical 60 hours

Prerequisites: S0964, S0967, S0968, S0969

Content:

S0970.1	Flashing Membranes 2
S0970.2	Metal Flashings 2
S0970.3	Types of Membrane 2 – Built Up Roofing
S0970.4	Types of Bitumen 2 – Built Up Roofing
S0970.5	Field Sheets and Flashings 2 – Single Ply Roofing
S0970.6	Base Sheets and Flashings 2 – Two Ply Roofing
S0970.7	Cap Sheets and Flashings 2 – Two Ply Roofing

Evaluation & Testing: Objective tests, assignments and practical demonstrations including:

- flashing technique integrated into other units (built-up roofs, single ply, two-ply)
- counter-flashing of a curb, parapet and gravel stop using pre-finished galvanized metal
- handling and installation of built-up roof membranes
- use of asphalt, mastic and aggregate
- field sheets and flashings
- Installation of base sheets and flashing
- applying cap sheets and flashing

S0970.1 Flashing Membranes 2

Duration: Total 7 hours Theory 3 hours Practical 4 hours

Cross Reference to Training Standards: U5223.9

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to install flashing membranes in various roofing applications in accordance with drawings, specifications, manufacturers' guidelines and the Canadian Roofer Contractor's Association (CRCA) manual.

LEARNING OUTCOMES AND CONTENT

1.1 Describe procedures for installing membrane flashings for walls, perimeters, curbs, projections, expansion and control joints, pitch boxes, sleeves, drains and scuppers,

1.2 Demonstrate installation of membrane flashing for curbs and projections using all methods of applications.

S0970.2 Metal Flashings 2

Duration: Total 8 hours Theory 1 hours Practical 7 hours

Cross Reference to Training Standards: U5223.12

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to apply metal flashings in various roofing applications.

LEARNING OUTCOMES AND CONTENT

2.1 Describe common types of metal counter flashing and their characteristics.

2.2 Discuss application procedures for metal copings.

2.3 Flash a curb, parapet and gravel stop.

2.4 Use pre-painted galvanized metal to make:
- gravel stops
- inside corners with standing seam
- outside corner with standing seam
- curbs for units or skylights with standing seam

S0970.3 Types of Membrane 2 – Built Up Roofing

Duration: Total 21 hours Theory 11 hours Practical 10 hours

Cross Reference to Training Standards: U5223.02; U5223.08

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the various types of membranes and application procedures for built-up roofing, in accordance with drawings and specifications, manufacturers' guidelines and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

3.1 List innovations in built-up roofing and their definitions.

3.2 List terms related to the manufacture and handling of built-up roof products.

3.3 Identify types of membranes.
- organic felt
- inorganic felt
- coated felt
- smooth or mineral-surfaced materials
- fibreglass felt
- SBS APP modified

3.4 Describe procedures for storing and handling built-up roof roll materials.

3.5 Describe how to protect the roof membrane from sun damage, temperature extremes, wind and fire.

3.6 Identify precautions when installing membranes on sloped roofs.

3.7 Describe the installation of roofing membranes.

3.10 Describe how different membranes are manufactured.

3.11 Describe the effects of solar radiation on a built-up roof.

3.12 Describe the effects of radiative cooling on a built-up roof.

3.13 Describe thermal movement and its relation to insulation problems.

3.14 Describe thermal shock.

3.15 Describe advantages of an inverted roofing method application (IRMA).

3.16 Demonstrate:

- inspection and set-up of kettle
- light up of kettle
- locate and place propane cylinders
- mop rolls of felt
- throw in rolls of felt
- mop perimeters with 18" parapets
- membrane flash perimeters with felt on a 18" parapets
- mop and apply felt on curbs for skylights or units
- mop and apply mineral surface to parapets

S0970.4 Types of Bitumen 2 – Built Up Roofing

Duration: Total 6 hours Theory 1 hours Practical 5 hours

Cross Reference to Training Standards: U5223.08

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to describe the various types of bitumen and application procedures for built-up roofing, in accordance with drawings and specifications, manufacturers' guidelines and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

4.1 Identify various types and distinguishing characteristics of bitumen:
- Asphalt -- types i, ii, iii, rubberized, modified
- Pitch -- type i

4.2 Identify uses for the different types of bitumen and their limitations.

4.3 Identify working practices and personal safety considerations for working with Type I coal tar bitumen.

4.4 Describe procedures for flood-coating the roof membrane to protect and seal the roof membrane.

4.5 Clean the work site of debris during and after completion to ensure a safe working environment.

4.6 Discuss and interpret terms such as equiviscous temperature (EVT), flash point, softening point, heating and application temperature.

4.7 Describe the use of cold process adhesive/bitumen for built-up roofing applications.

S0970.5 Field Sheets and Flashings 2 – Single Ply Roofing

Duration: Total 24 hours Theory 5 hours Practical 19 hours

Cross Reference to Training Standards: U5224.1; U5224.2; U5224.3; U5224.4

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to apply field sheets and flashings (EPRS) in single ply roofing, in accordance with drawings and specifications, manufacturers' guidelines and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

5.1 List terms related to application techniques for sheet-applied single ply roofing systems and their definitions.

5.2 Identify the following single ply-roof membrane systems and their characteristics including:
EPDM - (ethylene propylene diene monomer) roof membrane system
NEO - (neoprene) polychloroprene roof membrane
PVC - polyvinyl chloride roof membrane system
CPE - chlorinated polyethylene roof membrane system (Hyphalon)
TPO – thermoplastic polyolefin

5.3 Complete a list of statements concerning the application procedure for wall flashings in an EPDM system.

5.4 List in order the application procedure for installing a seam in an EPDM system.

5.5 Describe the application procedure for flashing inside and outside corners in an EPDM system.

5.6 List in order the application procedure for flashing a drain in an EPDM system.

5.7 Describe the procedure for welding butted PVC seams.

5.8 Describe the procedure for hot air welding PVC & TPO seams when using hand held and robotic welders.

5.9 Describe the procedure for making t-seams in PVC, TPO and EPDM applications.

5.10 List in order the steps for inspecting and repairing seams in PVC & TPO membranes.

5.11 Describe the procedure for sealing seams in PVC, TPO or EPDM membranes.

5.12 Describe the procedure for membrane termination in preparation for PVC, TPO or EPDM wall flashings.

5.13 Describe the procedure for sealing prefabricated PVC, TPO or EPDM inside and outside corners.

5.14 List three other considerations concerning PVC, TPO or EPDM systems

5.15 Demonstrate:

using PVC / TPO	**using EPDM**
operate heat gun	recognize when contact cement is flashed off or frozen
weld straight seams	do single pipe wrap, double pipe wrap and a triple pipe wrap
make a basic straight pipe flange	do a single pipe wrap on the side
make a enclosed pipe flange	do an inside and outside corner with a repair patch
make a side pipe flange	individually layout and make flanges for b vent tall cone flashing
individually layout and make flanges for b vent tall cone flashing	do straight seams with adhesives, with tape, and mechanically fastened as a group project
weld inside and outside canted corners and repair patch	

S0970.6 Base Sheets and Flashings 2 – Two Ply Roofing

Duration: Total 8 hours Theory 1 hours Practical 7 hours

Cross Reference to Training Standards: U5226.1; U5226.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to apply base sheets and flashing in two-ply roofing, in accordance with drawings and specifications, manufacturers' guidelines, building codes and by-laws and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

6.1 Discuss the importance of torch safe substrates when installing base sheets.

6.2 Identify the advantages of using recovery board as a substrate for modified base sheets.

6.3 Identify the different characteristics between torch down or mop down modified base sheets.

6.4 Describe the application procedures for flashing a modified bitumen roofing system.

6.5 Describe installation procedures for base flashing.

6.6 Identify the hazards when using torches in the proximity of open perimeters and painted perimeter materials.

6.7 Demonstrate:
- light and adjust flame on torches
- torch base field sheets to a sloped roof
- torch base flashing to a 4' parapet wall
- install base flashing around curbs for skylights and units
- install base around flanges and drains

6.8 Discuss hazards associated with torch applied roofing systems and procedures required to establish a fire watch.

S0970.7 Cap Sheets and Flashings 2 – Two Ply Roofing

Duration: Total 10 hours Theory 2 hours Practical 8 hours

Cross Reference to Training Standards: U5226.2; U5226.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to apply cap sheets and flashing in two-ply roofing, in accordance with drawings and specifications, manufacturers' guidelines, building codes and by-laws and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

7.1 List terms used with a modified bitumen roof system.

7.2 Describe the application procedure for a modified bitumen roof system.

7.3 Discuss applications procedures for various types of cap sheets to ensure that the seal is watertight and the sheets are straight and true with no fishmouths, wrinkles, or damage.

7.4 Describe installation procedures for cap flashing.

7.5 Install cap flashing, ensuring that the installation is aesthetically pleasing and completed according to manufacturers' instructions and drawings and specifications.

7.6 Discuss precautions when applying thermo-fusible membrane in colder temperatures.

7.7 Describe the procedures for applying aggregate on a modified bitumen roof system.

7.8 Demonstrate:

- light and adjust flame on torches
- torch cap field sheets on a sloped roof
- torch cap flashing on a 4' parapet perimeter
- do corner appearance on a 4' parapet
- install cap flashing around curbs for skylights and units
- install cap flashing around flanges and drains

7.9 Discuss hazards associated with cap sheets and flashing for two ply roofing.

Number:	**S0971**
Reportable Subject:	**ROOF MAINTENANCE 2**
Duration:	Total 24 hours Theory 13 hours Practical 11 hours
Prerequisites:	S0965
Content:	S0971.1 Stripping 2 S0971.2 Re-roofing and Resurfacing 2 S0971.3 Roof Repair 2 S0971.4 Water and Damp Proofing 2
Evaluation & Testing:	Objective tests, assignments and practical demonstrations including: - re-roofing skills - roof repair - waterproofing technique on vertical surfaces

S0971.1 Stripping 2

Duration: Total 4 hours Theory 2 hours Practical 2 hours

Cross Reference to Training Standards: U5218.11; 12; U5218.13; U5218.14; U5218.15; U5218.16; U5218.17

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to strip a roof in preparation for roofing applications, to ensure the protection of building, grounds and the property of others, in accordance with local regulations and company policies.

LEARNING OUTCOMES AND CONTENT

1.1 Describe how to set up equipment for roof removal to ensure the protection of building, grounds and property.

1.2 Describe the installation of interior and exterior building protection to avoid damage to clients' property through dust and debris.

1.3 Describe closing and opening procedures of building orifices to prevent debris and fumes from entering the building.

1.4 Describe how to protect skylights or windows from damage during stripping.

1.5 Remove loose gravel and debris.

1.6 Discuss the maximum area to be stripped per day according to existing conditions.

1.7 Cut and remove roof membrane to expose substrate.

1.8 Clean the work site of debris during and after completion to ensure a safe working environment.

1.9 Describe measures to be taken in order to assure overnight protection against leaks.

S0971.2 Re-roofing and Resurfacing 2

Duration: Total 8 hours Theory 5 hours Practical 3 hours

Cross Reference to Training Standards: U5222.3; U5222.4; U5222.5

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to re-roof and resurface in accordance with good work practices, company policy, manufacturers' instructions and the CRCA manual.

LEARNING OUTCOMES AND CONTENT

2.1 List terms related to re-roofing with EPRS and their definitions.

2.2 Describe closing and opening procedures of building orifices to prevent debris and fumes from entering the building.

2.3 Describe how to protect skylights or windows from damage while re-roofing.

2.4 Complete a list of general requirements concerning aggregate removal.

2.5 Complete a list of general requirements for re-roofing with EPRS.

2.6 List types of slip-sheets and their application requirements.

2.7 Describe how to locate area to be repaired.

2.8 Describe how to locate leaks in different types of deck.

2.9 Describe how to assess the age and life expectancy of a roof.

2.10 Describe how to apply new roofing surface.

2.11 Clean the work site of debris during and after completion.

S0971.3 Roof Repair 2

Duration: Total 5 hours Theory 3 hours Practical 2 hours

Cross Reference to Training Standards: U5222.1; U5222.2; U5222.3; U5222.4

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to complete a variety of roof repairs.

LEARNING OUTCOMES AND CONTENT

3.1 List terms related to maintenance and repair of elasto-plastic roofing systems (EPRS) and their definitions.

3.2 Describe why EPRS require programmed maintenance.

3.3 Complete a list of specific items to look for in an EPRS maintenance inspection.

3.4 Differentiate between the methods for finding leaks in a fully adhered EPRS and a loose laid and ballasted EPRS.

3.5 List in order the steps in repairing sheet-applied EPRS.

3.6 Describe long-term considerations for EPRS maintenance.

3.7 Explain documented EPRS problems that can serve as inspection guidelines.

3.8 Complete a list of ways maintenance and inspection can contribute to improvements in the state of the art of EPRS.

3.9 Describe how to locate area to be repaired.

3.10 Describe how to locate leaks on different types of deck.

3.11 Describe how to remove existing flashing to provide access to roof for repairs.

3.12 Assess the roofing area to determine the suitability of temporary or permanent roof repair.

3.13 Explain types of roof splits and ways to identify them.

3.14 List in order the steps in repairing small splits with liquid-applied materials.

3.15 List in order the steps in repairing large splits with liquid-applied materials.

3.16 List in order the steps in repairing types of blisters.

3.17 List three types of problems with flashing on an old roof.

3.18 List in order the procedure for repairing leaks in the seams of counter flashing of metal fascia.

3.19 Describe the procedure for repairing old membrane edges that are split away from flashing.

3.20 List in order the procedure for repairing flashing felts loose at the edges.

3.21 List in order the procedure for repairing leaks through loose joints at a parapet wall.

3.22 Describe general rules for repairing curbs and penetrations.

3.23 Describe general re-roofing requirements for sheet-applied systems.

3.24 List sketching requirements for re-roofing.

3.25 Solve problems related to re-roofing with EPRS.

S0971.4 Water and Damp Proofing 2

Duration: Total 7 hours Theory 3 hours Practical 4 hours

Cross Reference to Training Standards: U5221.1; U5221.2; U5221.3

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to perform water and damp proofing applications following drawings and specifications, and manufacturers' instructions.

LEARNING OUTCOMES AND CONTENT

4.1 List terms related to waterproofing and damp proofing and their definitions.

4.2 State a rule of thumb for waterproofing requirements.

4.3 Differentiate between damp proofing and waterproofing applications.

4.4 List two solutions to the problem of hydrostatic pressure.

4.5 List categories of damp proofing and their objectives.

4.6 Describe special considerations for damp proofing materials.

4.7 Complete a list of reasons why waterproofing requires meticulous work.

4.8 List below-grade hazards in waterproofing and ways to avoid them.

4.9 List above-grade hazards in waterproofing and ways to avoid them.

4.10 Describe how to use backfill operations to good advantage.

4.11 Differentiate between traditional and other waterproofing systems.

4.12 List situations where cold-applied waterproofing systems are advantageous.

4.13 List characteristics and typical uses of sheet-applied membrane waterproofing.

4.14 Describe special considerations for adhesives used with sheet-applied membrane waterproofing.

4.15 Describe characteristics of fabrics and their general uses.

4.16 Describe storage of damp-proofing and waterproofing materials.

Number:	**S0972**
Reportable Subject:	**SLOPED ROOFING 2**
Duration:	Total 12 hours Theory 6 hours Practical 6 hours
Prerequisites:	S0966
Content:	S0972.1 Installation – Shingles, Tiles, Rigid Material 2 S0972.2 Repair – Shingles, Tiles, Rigid Material 2
Evaluation & Testing:	Objective tests, assignments and practical demonstrations including: - installation projects - repair skills

S0972.1 Installation – Shingles, Tiles, Rigid Material 2

Duration: Total 6 hours Theory 3 hours Practical 3 hours

Cross Reference to Training Standards: U5225.01; U5225.02; U5225.03; U5225.04; U5225.05; U5225.06

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to install shingles, tiles and preformed rigid sheeting materials, in accordance with drawings, specifications, manufacturers' guidelines, building codes and by-laws, CSAO, the CRCA manual, the OHSA, WHMIS guidelines and clients' requests.

LEARNING OUTCOMES AND CONTENT

List terms related to steep roofing with wood and fibreglass shingles and their definitions.

1.1 Describe site preparation for steep roofing.

1.2 List three general ladder safety rules for steep roofing.

1.3 List types of roof brackets with their characteristics.

1.4 List ways to attach roof brackets.

1.5 Describe steep roofing hoisting methods with their uses.

1.6 Describe types of wood shakes with their characteristics.

1.7 Describe installation procedures for strapping and fastening strips to support and fasten tiles, cedar shakes, slate and pre-formed single and sheet material.

1.8 Describe installation procedures for tile, slate, cedar shakes and pre-formed shingle and sheet materials to ensure a watertight covering, spacing, overlaps, and alignment, so that finished rooflines are straight and rue and aesthetically pleasing.

1.9 Perform caulking and sealing operations including tube caulking and trowel caulking on chimneys, pipes, louvers, and non-metallic wall flashings to seal and waterproof installations.

1.10 List in order the procedure for re-roofing over old asphalt shingles.

1.11 List two guidelines for re-roofing over asphalt roll roofing material.

1.12 Discuss the effects of the predominant wind.

S0972.2 Repair – Shingles, Tiles, Rigid Material 2

Duration: Total 6 hours Theory 3 hours Practical 3 hours

Cross Reference to Training Standards: U5225.06

GENERAL LEARNING OUTCOMES

Upon successful completion, the apprentice is able to repair shingles, tiles and preformed rigid sheeting materials, in accordance with drawings, specifications, manufacturers' guidelines, building codes and by-laws, CSAO, the CRCA manual, the OHSA, WHMIS guidelines and clients' requests.

LEARNING OUTCOMES AND CONTENT

2.1 Describe preparation for repairing with wood shingles and wood shakes.

2.2 List four precautions to be followed when preparing for repairing with wood shingles and wood shakes.

2.3 Perform tie-ins and repairs on shingle tile/slate, cedar shakes, and pre-formed sheet roofs to achieve a watertight seal, spacing, overlaps and an aesthetically pleasing appearance.

2.4 Discuss the effects of the predominant wind.